Indiana Science

# Physics I: Grades 9, 10, 11, 12

Adopted 2022

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| Forces and Interactions | HS-PS2-1. | Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. HS-PS2-1 |
| | HS-PS2-2. | Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. HS-PS2-2 |
| | HS-PS2-3. | Apply scientific and engineering ideas to design, evaluate, and refine a device for example, one that minimizes the force on a macroscopic object during a collision. HS-PS2-3 |
| | HS-PS2-4. | Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. HS-PS2-4 |
| | HS-PS2-6. | Use mathematical representations to represent simple harmonic motion and pendulums. HS-PS2-6 |
| Energy | HS-PS3-1. | Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. HS-PS3-1 |
| | HS-PS3-2. | Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). HS-PS3-2 |
| | HS-PS3-3. | Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS3-3 |
| | HS-PS3-5. | Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. HS-PS3-5 |
| | HS-PS3-6. | Design, develop and analyze simple circuits and circuit elements. HS-PS3-6 |

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| **Wave Properties** | **HS-PS4-1.** | **Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.** HS-PS4-1 |
| **Electromagnetic Radiation** | **HS-PS4-3.** | **Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.** HS-PS4-3 |
| | **HS-PS4-4.** | **Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.** HS-PS4-4 |